



Research article

Dimensionalized goal orientation, innovation climate, and knowledge sharing behavior in higher education research teams

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ABSTRACT

Knowledge sharing behavior (KSB) in the work process is governed by achievement goals and organizational environments. It is of great value to focus on whether achievement goal orientation can effectively predict the employees knowledge sharing in the context of team innovation climate. On the basis of the data from 29 scientific research teams in China's higher education, a multi-layer linear model is constructed to investigate the cross-level relationship. The study finds that learning goal orientation (LGO) and performance proof orientation (PPO) contribute to knowledge sharing, performance avoidance orientation (PAO) tends to be knowledge hiding, and their political skills (PS) consolidate the connections. Team innovation climate not only promotes knowledge sharing behavior, but also activates the traits related to individuals' shared behavior in performance proof orientation, which has enhanced the relationship between achievement goal orientation and knowledge sharing, but has no effect on learning goal orientation and performance avoidance orientation.

1. Introduction

Knowledge sharing, the constituent and key link of knowledge management, has been fully confirmed in theory and practice for its positive role in improving team creativity and organizational performance [1–3]. However, the knowledge sharing behavior in the work process is governed by achievement goals and organizational environments. Whether achievement goal orientation can effectively predict employee knowledge sharing in the context of team innovation climate is unanswered.

The current research on the relationship between goal orientation and knowledge sharing is conducted mainly from three aspects. Firstly, some scholars take team psychological safety [4], performance appraisal [5], job burnout [6], and leader boundary spanning [7] as the moderating variables to analyze the influence mechanism of goal orientation on knowledge sharing. Secondly, some researchers, such as Qi Qi et al. [8], Syed Muhammad Shariq et al. [9], Talat Islam et al. [10] have adopted goal orientation as a mediator variable to analyze the influencing factors of knowledge sharing. Thirdly, scholars including Xu et al. [10], Lin et al. [11], Najam [12] and Jia et al. [13] also study the impact of a particular goal orientation on knowledge activity. These results lay the foundation for future research, but there are still some shortcomings.

Firstly, individuals can effectively participate in the activities of the organization only when they have political skills [14]. Regardless of the motivation, whether the achievement goals of the employees can be achieved in the work situation is also influenced by their political skills factors [15]. In the workplace, people with political skills are good at understanding the intentions of others and adjusting their behavior in the face of changing situations, so they can easily improve their ability to achieve personal goals [16,17].

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Therefore, dissecting the impact mechanism of political skills on the relationship between goal orientation and knowledge sharing can help perceive and comprehend the connection.

Secondly, the process of knowledge sharing is also influenced by the organizational situation. Scholars have studied the effect of organizational environment factors on knowledge sharing activities from different perspectives, such as management support [18], psychological safety [19], rewards and support systems [20], monitoring distance [21], performance appraisal methods [22], ethical leadership and collaborative culture [23], transformational leadership [24], initiative climate [2], management teams [25], subjective norms or psychological empowerment [26], communication methods [27], and relational social capital [28]. However, the diversity and variability of organizational climate factors make knowledge sharing and innovation management within organizations more complex and inefficient. For example, employees feel confused and at a loss in an organization where some organizational support factors (such as negotiation leadership style, network communication mode, etc.) and organizational constraints (such as individual-oriented performance evaluation methods, close range monitoring, etc.) coexist. Therefore, there are limitations to conclude from one single perspective in management practice. Innovation climate is a comprehensive indicator involving multiple factors to collaborate, synthetically reflecting an individual's subjective experience of whether and how much the organization has an innovative environment. Therefore, it is of great research value and practical significance to explore the relationship between individual goal orientation and knowledge sharing from the perspective of innovative atmosphere.

Based on the relevant literature review above, it can be found that there is still little research on the impacting mechanism of political skills on the relationship between individual goal orientation and knowledge sharing; and it can also be found that the role of innovative atmosphere in the relationship between goal orientation and knowledge sharing remains an unresolved issue. What particular individuals who possess the traits or orientations are more inclined to share one's knowledge? What are the differences in knowledge sharing between employees with different traits within a team? Which teams are better able to stimulate employee in knowledge sharing behavior? In order to answer the questions above, this article attempts to open the "Black box" between achievement goal orientation and knowledge sharing behavior, analyze the impact mechanism of political skill differences on knowledge sharing behavior between individuals with different goal orientations based on the achievement motivation theory and individual-situation interaction theory, and to explore the cross-level effect of team atmosphere on employees' knowledge sharing behavior by constructing a multi-layer linear model so as to enrich relevant theoretical literature and provide useful insights into knowledge management practices in higher education institutions.

2. Literature review and hypotheses development

2.1. Knowledge sharing and knowledge sharing motivation

Knowledge sharing is the constituent and key link of knowledge management. As Law and Ngai et al. [29] indicate, "a lack of sharing may inhibit or hinder knowledge management". Knowledge sharing is regarded as a determining factor of an individual and organizational learning [30], job satisfaction [31–33], organizational performance ([34,35], and innovative capability [36,37]. However, knowledge sharing does not take place naturally, and the flow of knowledge within an organization is not an easy issue [38–40]. In reality, employees' low willingness to share knowledge is always considered to be an urgent problem which should be solved in modern knowledge management [5,41]. Knowledge sharing refers to the exchange of knowledge between individuals, teams, units, or organizations [42]. The term "knowledge sharing" is commonly used to describe a one-way knowledge exchange, like explaining a work process to the colleagues or recording a process in the guidelines. Knowledge sharing can also be bi-directional, such as during team meetings or consulting processes. In this study, knowledge sharing is confined to knowledge donation at the individual level.

Researchers from different disciplines have noted the critical role of motivation. As early as 1988, Baldwin and Ford [43] found that individual ability and motivation were important factors affecting knowledge transfer. Studies by Hendriks [44] and Hussin et al. [45] show that motivation such as sense of achievement, job responsibility, recognition, work autonomy, promotion opportunities and job challenge directly promote individual's knowledge sharing behavior. Osterloh and Frey [46] argue that internal motivation can promote implicit knowledge sharing. Cummings et al. [47] and Hon Alice et al. [48] show that the motivation of both the knowledge providers and the knowledge absorbers are key factors driving the success of knowledge sharing. Yang [49], Yong et al. [50], Jie Chen et al. [51] find that individual knowledge sharing attitudes can actively promote knowledge sharing behaviors.

On the other hand, some scholars have analyzed the barriers to knowledge sharing caused by the lack of motivation. Szulanski G [52]. finds that the lack of corresponding motivation of the knowledge providers and the knowledge recipients is an important factor in generating knowledge stickiness, which hinders knowledge transfer within the organization. Although barriers to knowledge sharing may include improper organizational structure, organizational culture unfavorable to sharing, and faction segmentation [53,54], the decisive factor is whether knowledge employees are motivated to share knowledge with others. Salary, working conditions, status and interpersonal relationships are hygiene factors in the motivation of knowledge sharing, whose absence will hinder knowledge sharing [44,54]. According to Stenmark [55] and Nguyen et al. [56], the employee without a strong personal motivation is unlikely to share knowledge. Siemsen et al. [57], Koriati et al. [58] and Iqbal et al. [59] show that, like the opportunity and ability factors, individual motivation may also be a limiting factor in their knowledge sharing behavior, which means when individual motivation is weak, individuals may not share knowledge even when the opportunity and ability requirements are met.

The motivation to share knowledge is a special kind of work motivation. Findings on knowledge sharing motives are rather fragmented and often obtained from the single motives instead of the comprehensive models integrating multiple motivation factors [60]. Lin [61] considers the expected rewards, reciprocal benefits, self-efficacy and enjoyment in helping others to be the determinants

of knowledge sharing intentions. Although the model identifies the fundamental difference between external motivation and internal motivation, it cannot be conceptualized as knowledge sharing motives. Moreover, some scholars point out that the focus on these four determinants might be too limited [62].

Many other scholars [63,64], based on self-determination theory, establish knowledge sharing motives in terms of a continuum from intrinsic motivation to extrinsic motivation. While these findings tell us whether knowledge sharing is extrinsically or intrinsically motivated, they do not tell us exactly why people share their knowledge [65]. If motivation is measured in general instead, we are not able to fully understand the theoretical mechanisms behind knowledge sharing. Cai et al. [66] argue that if knowledge sharing motives are comprised of the motives related to the special kind of work motivation, we can more easily explain what drives employees to share knowledge. Hence, it is worthwhile to probe into a domain-specific knowledge sharing behavior based on specific motives.

2.2. Goal orientation and knowledge sharing behavior

2.2.1. Achievement motivation and achievement goal theories

According to psychologists, achievement motivation is an internal drive that promotes people to engage in activities to reach certain achievement goals, and it directly affects the way people think and behave. Achievement motivation theory suggests that an achievement goal orientation is a motivational orientation that reflects an individual's self-development beliefs, and influences the individual's understanding of the conditions for achieving goals and the way the individual responds [67,68]. Goal orientation refers to the basic orientation of the individual's choice and pursuit of achievement goals in the achievement situation [69]. It suggests that these beliefs positively guide the individual's perception and understanding of environmental information.

The theory of achievement goal is the theory of individual achievement motivation and its corresponding behavior from the perspective of social cognition [70]. The connotation of goal orientation fall into the following two Categories [71]: one emphasizes (such as Nicholls) the relative stability of goal orientation, and believes that goal orientation is a certain temperament tendency in personality characteristics, so it has relative stability; the other viewpoint (such as Steven, Gist, Steele., etc.) holds that the goal orientation is only the target state based on experimental scenarios or background conditions, which is substantially influenced by tasks and activities, and different task situations may lead to different goal orientation, so the goal orientation is not stable. Currently most of the studies [72–74] adopt the connotation of state goal under the work background, emphasizing the individual understanding mode and investment degree of the work environment under the self-development belief. Scenario factor is the key influencing element of goal orientation, resulting from the interaction between individuals and the scenario. The relationship between situational factors and goal orientation needs to be further explored. Situational factors such as organizational change, innovation climate, organizational culture and leadership are important factors which can induce the individual goal orientation to work properly. It is difficult to accurately describe the formation and dynamic evolution process of individual goal orientation without the scene factors. Further exploring the internal mechanism of situational factors on goal orientation is an important way to improve the theoretical system of goal orientation.

In the work context, the three achievement targets proposed by VandeWalle et al. [75] are widely accepted and applied by researchers [76,77]. According to the definition of VandeWalle et al. [75], achievement goals include learning goal orientation, achievement proof goal orientation, and achievement avoidance goal orientation. Among them, learning goal orientation aims to improve ability and better control the work task; achievement proof goal orientation tends to show off themselves and prove that their ability is stronger than others; achievement avoidance goal orientation is inclined to hide shortcomings and avoid exposing their ability to others [78]. Achievement goals play a dominant role in an individual's psychological processes, serving as the foundation for understanding the relationship between the situation and oneself and making responses [69]. Previous studies have shown that individuals with dominant learning goals are often not afraid of failure and criticism and are willing to exercise their abilities through the problem-solving process in order to complete the tasks better [79]; individuals with superior performance goals tend to take on important responsibilities and challenge the difficult tasks alone in order to highlight themselves in order to attain achievements that surpass others [80]; individuals who possess the avoiding performance goals tend to avoid challenges as much as possible in order to reduce failure, and often retreat when faced with the difficult tasks [81]. It can be noted that achievement goals greatly affect an individual's performance and outcomes in all respects [82,83]. Discrepancy in achievement goal orientations will lead to differences in individuals' perceptions and emotions about organizational situations, which will in turn result in different behavioral choices [84, 85]. Therefore, the achievement goal theory can provide an important theoretical basis for studying the formation mechanism and effectiveness of employee knowledge sharing behavior.

2.2.2. The learning goal orientation and knowledge sharing behavior

Learning goal orientation individuals aim to acquire new knowledge and skills, regarding work tasks as a learning experience and an opportunity to develop competencies. They implement deep learning processing strategies, focus on the development of personal competencies, and exhibit a "control" response pattern in their behavior. Current research suggests [86,87] that learning goal-oriented individuals attempt to acquire the skills which are required to complete a job task and the knowledge associated with improving the skills. It is also suggested that the intrinsic motivation of learning motivates them to actively consult with colleagues for job advice and problem solutions, which will trigger a flow of knowledge and information. LePine et al. [88] has also pointed out that learning orientation can lead to more cooperation among team members, sharing knowledge and information about problem solving, and thus the team shows positive adaptability. Employees with a high learning orientation have clear learning goals in their work and will strive to try challenging new tasks or seek various opportunities to improve their work skills and knowledge level [27,89]. Therefore, they will strive to acquire knowledge to cope with various risks and challenges, and thus exhibit more knowledge acquisition behavior in

the team [9,90]. Knowledge employees with a learning orientation tend to actively share their ideas and suggestions with the others as to establish a reciprocal relationship with other members through knowledge sharing, which can help them obtain more effective feedback and more knowledge.

Hypothesis H1a. Learning goal orientation of team members is positively related to knowledge sharing behavior.

2.2.3. *The performance proof orientation and knowledge sharing behavior*

Currently, scholars differ greatly in the relationship between performance proof orientation and knowledge sharing behavior. Some scholars advocate that performance proof orientation has a positive impact on knowledge sharing behavior. For example, Ryan's research suggests that performance proof-oriented individuals are more willing to actively communicate with others, share their knowledge, skills, and successful experiences in order to prove they are stronger than others. Although the skills and abilities demonstrated by employees may not be recognized by their supervisors, it will objectively promote employees to actively share knowledge [80,83]. They pay more attention to their performance and consider work results as a validation of their work ability [13].

However, some scholars have also proposed opposite views. For example, the research by Poortvliet et al. [91] has confirmed that performance proof-oriented individuals have a completely different cognitive framework and values from learning-oriented individuals, and they adhere to the principle of utilizing others, that is, they always give as little as possible in information exchange and obtain as much useful information from others as possible. Taegoo et al. [92] propose also that individuals with performance goal orientation intend to demonstrate their abilities, and they are concerned that sharing their knowledge will lose their advantage as knowledge owners. But Zhou et al. [22] find that the negative effect of performance proof orientation on knowledge sharing behavior is not significant in a survey of Chinese technology companies.

Considering the current context of fierce competition and limited opportunities in the colleges and universities, it is reasonable to speculate that performance proof-oriented individuals will try their best to display a perfect image of "perfection" in order to obtain favorable comments from the surrounding community. Although exchanging information and sharing knowledge "generously" with others is not necessarily their original intention, the external "temptation" from university organizations is high enough to motivate them prove themselves in an eager way, resulting in de facto knowledge sharing behaviors. Therefore, it can be expected that in a work team scenario, individuals with high performance proof orientation are more inclined to share their private knowledge and experience with others compared to other goal-oriented members. Therefore, the following proposition is made.

Hypothesis H1b. Performance proof orientation of team members is positively related to knowledge sharing behavior; relative to learning goal orientation, performance proof orientation is more closely related to knowledge sharing behavior.

2.2.4. *The performance avoidance orientation and knowledge sharing behavior*

Employees with high avoidance orientation are afraid of being negatively evaluated by others, so they tend to have a knowledge-based mindset and are reluctant to share knowledge with other team members. On the one hand, they avoid showing their incompetence, and on the other hand, they worry about the loss of personal competitiveness [9,93,94]. Individuals with performance avoidance orientation perceive seeking help as an implication of their own incompetence and are less willing to seek necessary help. They are afraid that they will make a mistake in helping others and make themselves "look stupid", thus reducing their willingness to help others [95]. Research also shows that individuals with a high performance avoidance orientation believe that their individual abilities are fixed and not improved due to hard work, and they are more prone to negative behaviors caused by setbacks and failures [2,96]. By incorporating research findings into the research team's scenario, it can be inferred that performance avoidant employees often conceal their knowledge and are unwilling to actively contribute knowledge to team members because they are worried that the knowledge they provide may be incorrect and may tarnish their good reputation. When receiving and absorbing knowledge, they are also afraid of exposing their shortcomings and incurring ridicule behind their backs, so, they show a lower willingness to share knowledge.

Hypothesis H1c. Performance avoidance orientation of team members is negatively related to knowledge sharing behavior.

2.3. *The moderating effect of political skill*

Scholar Pfeffer first proposes the concept of "political skills". Based on Pfeffer's foundation, Ferris et al. [15] put forward that political skills refer to the ability of individuals to effectively understand others in the workplace and use their knowledge and accumulated work experience to influence others, thereby improving their individual or organizational goals. Zellars et al. [97] argue that political skills are the ability to combine social agility and adjust one's behavior in different contexts, gain trust from others in a sincere manner, and effectively influence others. Zhou et al. [22] propose that political skills refer to the ability of individuals to exert influence on others based on their understanding of both themselves and situations in order to achieve their goals. At present, most scholars adopt the definition proposed by scholar Ferris et al. [15]. Research has shown that political skills can predict an individual's work attitude and career behavior, including job performance [98,99], turnover intention [100], manager performance [101], knowledge sharing [102,103], leadership effectiveness [104], organizational commitment [105], and promotion opportunities [106], cross disciplinary innovation [107] and cross-border behavior [108].

Political skills are the interpersonal interaction style and social skills in the work situation. Individuals with this ability are good at understanding others' intentions, and can adjust their behaviors timely in accordance with situations, so that others can be unconsciously influenced and controlled by their behaviors [93,109]. For the employees with learning orientation and performance proof

orientation, their high political skills can help them gain the trust and goodwill of the knowledge owner with their strong interpersonal influence and organizational coordination ability, and get more timely and useful information than the average persons [110]. To achieve individual and organizational goals, they take the initiative in a wide network of people to acquire the knowledge needed to facilitate goal fulfillment. They are always the most well-informed in the organization, and are more likely to get useful knowledge and help [5,17,111]. At the same time, they will also voluntarily contribute knowledge to other members of the organization in order to handle interpersonal relationships better, which is conducive to the formation of knowledge flow and knowledge sharing atmosphere.

Performance avoidance-oriented individuals with high political skills tend to have a knowledge possession mentality and are reluctant to share knowledge with other members of the team, fearing negative evaluation from others. In order to avoid mistakes that may lead to ridicule from others and expose their own incompetence, they tend to hide their knowledge subtly to avoid potential embarrassment and humiliation [17,112]. In order to achieve this goal, they deeply bury the motivation of serving in themselves while others always trust them with a sincere attitude [113,114]. They can always control and influence others according to their strategies. Although they may be in a negative situation, they always "save the day" again and again, making their hidden knowledge behavior look so natural and calm with their superb interpersonal influence, relationship expansion and organizational coordination. Therefore, the following proposition is made as below.

Hypothesis H2a. Political skills play a positive moderating role in learning goal orientation and knowledge sharing behavior.

Hypothesis H2b. Political skills play a positive moderating role in performance proof orientation and knowledge sharing behavior.

Hypothesis H2c. Political skills play a reverse moderating role in performance avoidance orientation and knowledge sharing behavior.

2.4. The influence of innovation climate on knowledge sharing behavior

The individual-situational interaction theory suggests that individuals interact with the environment, and individuals create environments through their own actions [115]. These conditions influence the individual's behavior via interaction. At the same time, the experience generated by the behavior can also partially determine an individual's personality, which in turn affect the individual's behavior in the future [116]. The significance of the situation for an individual does not lie in its objective attributes, but in the individual's subjective interpretation of the situational stimulus. Organizational climate is the perceptual and experiential experience of an individual's interaction with organizational situations, and it contains the individual's psychological meaningful representation of the organization's policies, procedures, and practices, which largely guides the individual's behavioral direction. A higher education research team refers to a formal group under the leadership of discipline/academic leaders, including higher education teachers and their graduate students, who collaborate with each other for common research goals and tasks. Innovation climate refers to the subjective perceptions and descriptions of team members about whether their work environment has innovative characteristics or not as well as its degree.

Current research suggests that organizational atmosphere influences employees' behavior by affecting their feelings and evaluations of the work environment, and organizational employees interpret events and understand desired behavior and its consequences based on the information provided by the environment [117–119]. Team innovation climate provides a relaxed, independent and trustworthy environment for improving the willingness of team members to share tacit knowledge [120]. The innovation climate of scientific research teams reflects team members' subjective perceptions of the environment such as organizational structures, processes, and events that affect the performance of their innovation capabilities. And such perceptions affect team members' attitudes, beliefs, and behavioral motivations and have a facilitating effect on their knowledge sharing and innovation behaviors. Innovation climate reflects the organization's encouragement and the support for new ideas and approaches, providing open opportunities for knowledge exchange [121,122]. In comparison, employees in the context of innovative teams are more inclined to share new ideas and innovative thoughts with others; the member's knowledge sharing behaviors occur more commonly and more frequently in teams with a profound innovative atmosphere. Therefore, the following proposition is made.

Hypothesis H3. Team innovation climate is conducive to team members' knowledge sharing behaviors.

The innovation climate in research teams not only has a direct effect on knowledge sharing, but also has an interactive effect on team members' knowledge sharing behavior together with personality characteristics. Owing to the discrepancy degrees of innovation climate, the relationship between members' personality traits and knowledge sharing behavior is different. The research of Bock et al. [123] shows that in an environment with a strong innovation climate, the employees tend to interpret knowledge sharing as an act that meets the expectations and interests of organizations and leaders, and knowledge sharing is advocated as a way of behavior beneficial to the overall interests; this situation effectively reduces the employees' concerns about disseminating "alternative" knowledge, and ultimately enables them to communicate or try new ideas more boldly. Liu F. et al. [124] propose that in an environment with a strong innovation climate, the behavior of sharing or disseminating knowledge is often highly valued and recognized by leaders and organizations. In a research team with a strong innovation climate, the free and open academic communication atmosphere, the interpersonal relationship of mutual trust, and the harmonious cooperation atmosphere make it easier for members to communicate and share various kinds of tacit and explicit knowledge with others. In such a relatively relaxed environment, the members can decide whether or not to participate in knowledge sharing without having to conceal themselves. In the research teams with low innovation climate, most of the work is standardized and proceduralized, and employees have little leeway to display potentials. For performance avoidance-oriented individuals, a low team innovation climate further reduces their willingness to share knowledge because the

knowledge sharing behavior itself is challenging and risky. Individual goal orientation may be a more accurate predictor of knowledge sharing behavior in some teams than in others because a team-level innovative atmosphere produces an environmental climate that encourages or inhibits members from pursuing goals and expressing their individuality. With absence of such environmental cues, they tend to choose action plans based on their personal preferences. Therefore, the team innovation climate not only has a main effect on members' knowledge sharing behavior, but also limits the effect of individual goal orientation on knowledge sharing behavior. The lower the innovation climate is, the more "silent" the members are as a whole, and the less significant the relationship between individual goal orientation and knowledge sharing behavior is. Thus, the following hypotheses are derived.

Hypothesis H4a. The lower the innovation climate is, the less significant the positive relationship between members' learning goal orientation and knowledge sharing behavior is.

Hypothesis H4b. The lower the innovation climate is, the less significant the positive relationship between members' performance proof oriented and knowledge sharing behavior is.

Hypothesis H4c. The lower the innovation climate is, the more significant the negative correlation between members' performance-avoidance oriented and knowledge sharing behavior is.

3. Methodology

3.1. Research model

Based on the above literature review and research hypotheses, the research model hereof is proposed as below (see Fig. 1).

3.2. Variable measurement

3.2.1. Independent variable and dependent variable

The operation and measurement methods of the concepts of individual goal orientation, team innovation climate, and knowledge sharing behavior are used as the tools for data collection herein by referring to the more mature scales in the existing literature. Among them, the individual goal orientation scale is appropriately modified based on the results of VandeWalle et al. [75]; the political skill scale directly uses the findings of Ferris et al. [15,17]; the team innovation climate scale, which is based on the research results of Anderson and West [125], involves the appropriate adjustment. The knowledge sharing behavior scale is mainly based on the research results of Bock et al. [123] and Yang et al. [126].

3.2.2. Control variable

First, team members' background variables such as gender, age, education, job title, and years of joining the team may have an impact on their knowledge sharing behavior. Such information is filled directly in the questionnaire. Second, team sample size is controlled within the scope of 10–20 members.

3.3. Data collection

The research team in this paper refers to the formal research group in formal research team composed of higher education teachers and their postgraduates who share common research goals and tasks, based on large subject groups, science and technology innovation platforms, academic research centers, key laboratories, etc. The team are generally led by professors/doctoral supervisors, and the core members are mainly composed of professors, associate professors, lecturers, and their graduate students. An ideal eligible team is

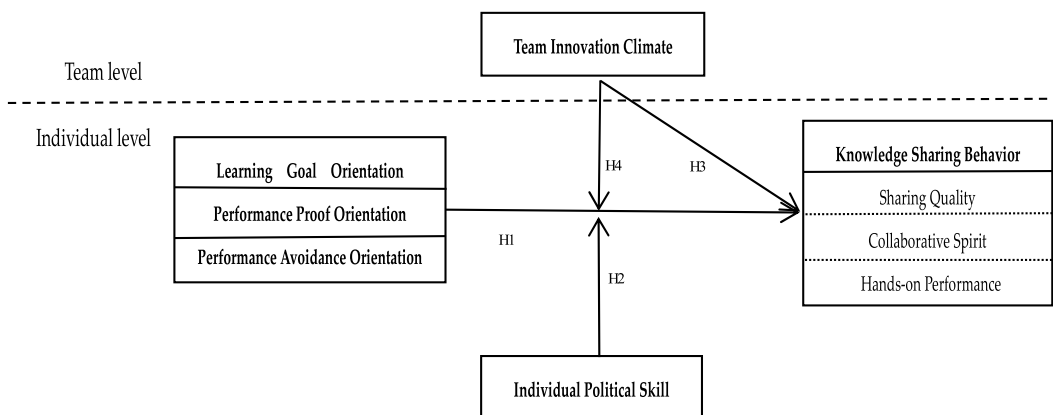


Fig. 1. Research model.

expected been established for more than 2 years and is now in normal operation. The respondents are required to join the scientific research team for more than half a year, and have participated in the substantive research work. According to the principle of typicality and purposiveness of sampling, the data of 29 research teams from 7 universities in Beijing, Hangzhou and Changsha are selected as research samples. Of these, 9 teams are derived from large subject groups, 6 from science and technology innovation platforms, 6 from academic research centers, 5 from key laboratories, and 3 teams are derived from the others. The data are collected from questionnaires. The distribution of the sample numbers is shown in [Table 1](#).

In the survey, 380 questionnaires are issued, and 345 valid questionnaires are recovered after excluding those with missing information, with a recovery rate of 90.8%. The basic characteristics of the valid sample are listed in [Table 2](#).

4. Data analysis

Traditional SPSS analysis can only consider a single level, such as the individual level. The Hierarchical Linear Model is a research method that considers both individual and overall factors. Both of these methods are commonly used for statistical analysis in the social sciences.

4.1. Reliability and validity test

We use SPSS23.0 statistical software to test the reliability and validity of the measurement model. Through the analysis (the results are shown in [Table 3](#)), the Cronbach - α coefficient and CR (Construct reliability) of each potential variable are all greater than the empirical value 0.7, the results show that the internal consistency of the construct indices is high, and the AVE values are all larger than the empirical value of 0.5, which indicates that the aggregation validity is high, and the AVE values of all constructs are larger than the square value of the correlation coefficients of all constructs. The results also indicate that the constructs have good discriminant validity.

4.2. Common method bias and data concordance test

The analytical data herein regarding individual goal orientation, individual political skill, team innovation climate, and knowledge sharing behavior are obtained from the same source (team members) by using the same questionnaire, with a higher recovery rate and better results, but is susceptible to the problem of common method bias. Harman's one-way test is used herein to examine whether the study data are subject to serious common method bias, and factor analysis is conducted by using a principal factor extraction technique for the measured items in the observed variables. According to the result, the first principal component is 21.39%, indicating that the common method bias in the data used in this study is within the permissible range and would not materially affect the study results.

This study examines the feasibility of aggregating the innovation climate perceived by individual team members on the team level in terms of both intra-group homogeneity and inter-group variability. According to the results, the mean value of the intra-group consistency coefficient Rwg for team innovation climate is 0.90, which meets the basic criteria. The inter-group variance reaches a significant level ($F = 21.55, p < 0.01$), indicating that there is a high degree of consistency in the evaluation of team innovation climate by members within the same team, and the data at the individual level can be aggregated to the team level for analysis.

4.3. Hypothesis test

4.3.1. Descriptive statistics and correlation coefficient matrix

The correlation coefficient matrix of variables is shown in [Table 4](#). The results show that there is a positive relationship with learning goal orientation and performance proof orientation ($r = 0.16, p < 0.01$), and a negative relationship with performance avoidance orientation ($r = -0.26, p < 0.01$; $r = -0.20, p < 0.01$); both learning goal orientation and performance proof orientation have a significant positive relationship with knowledge sharing behavior, with correlation coefficients of 0.30 ($p < 0.01$) and 0.43 ($p < 0.05$) respectively, and the negative correlation of performance avoidance orientation on knowledge sharing behavior is significant ($r = -0.36, p < 0.01$); the positive correlation of individual political skill on knowledge sharing behavior is significant ($r = 0.27, p < 0.01$). The above results indicate that the correlation between the variables is consistent with this hypothesis, and Hypotheses H_{1b} is partially supported.

Table 1

Distribution of the sample numbers.

Team type	#1	#2	#3	#4	#5	#6	#7	#8	#9
Large subject group (9)	13	12	15	14	15	12	10	18	11
Science and technology innovation platform (6)	12	15	17	12	12	14			
Academic research center (6)	16	14	10	17	11	12			
Key laboratory (5)	11	10	13	14	13				
The others (3)	12	14	11						

Table 2
Study sample composition and characteristics.

Characteristics	Category	Number	Ration (%)
Gender	Male	243	70.4%
	Female	102	29.6%
Age	30 years old and below	69	20.0%
	31 ~ 45 years old	224	64.9%
	45 years old and above	52	15.1%
Title	Senior	66	19.1%
	Deputy senior	117	33.9%
	Intermediate and below	162	47.0%
Education	Doctor	253	73.3%
	Master and below	92	26.7%
Duration to join the team	1 year or less	89	25.8%
	1 ~ 3 years	177	51.3%
	3 years and more	79	22.9%

Table 3
Reliability and validity test.

Constructs	Dimensions	Factor loadings	Cronbach's α	CRs	AVEs	
Learning	LGO-1	0.753 ^a	0.881	0.890	0.651	
	Goal	LGO-2				0.729 ^b
	Orientation	LGO-3				0.610 ^b
Performance	PPO-1	0.655 ^a	0.859	0.872	0.703	
	Proof	PPO-2				0.763 ^b
	Orientation	PPO-3				0.681 ^b
performance Avoidance	PAO-1	0.657 ^a	0.820	0.805	0.629	
	Orientation	PAO-2				0.704 ^b
		PAO-3				0.820 ^b
Individual	IPS-1	0.705 ^a	0.845	0.833	0.721	
	Political	IPS-2				0.732 ^b
	Skill	IPS-3				0.690 ^b
Team	TIC-1	0.759 ^a	0.793	0.787	0.570	
	Innovation	TIC-2				0.726 ^b
	Climate	TIC-3				0.603 ^b
		TIC-4				0.754 ^b
		TIC-5				0.740 ^b
Knowledge	KSB-1	0.755 ^a	0.745	0.761	0.663	
	Sharing	KSB-2				0.793 ^b
	Behavior	KSB-3				0.676 ^b
		KSB-4				0.683 ^b
		KSB-5				0.746 ^b

Note. A indicates that it is fixed to 1 in non-standard resolution; b represents $p < 0.000$, one side.

Table 4
Descriptive statistics and correlation coefficient matrix of the study variables.

variables	Mean	Standard deviation	1	2	3	4
Individual level (n = 345)						
1.Learning goal orientation	3.43	0.58	(0.83)			
2. Performance proof orientation	3.29	1.05	0.16**	(0.90)		
3.Performance avoidance orientation	3.22	1.25	-0.26**	-0.20**	(0.79)	
4.individual political skill	3.15	0.83	0.09	0.03	-0.01	(0.80)
5.Knowledge sharing behavior	3.41	0.89	0.30**	0.43*	-0.36**	27**
Team level (n = 29)						
Team innovation climate	3.19	0.79	(0.89)			

Note. Reliability coefficients of the scales are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.3.2. Hierarchical linear model analysis

Since analysis both at individual level and team level is involved, this paper uses the Hierarchical Linear Model (HLM) technique to validate the research hypotheses. The data structure is first analyzed using the confirmatory factor analysis (CFA) method, and the model fit is synthetically refined to form the results of $\chi^2 = 722.56$, RMSEA = 0.07, CFI = 0.90, $p < 0.01$, which shows a relatively good

model fit. The null model of the HLM is calculated as $\sigma^2 = 1.94$, $\tau_{00} = 0.16$, and the chi-square test as: $\chi^2(28) = 49.28$, $p < 0.05$. It indicates that the inter-group variance is significant, from which the cross-level correlation coefficient $ICC1 = 0.29$ can be calculated; besides, the data have multi-layer characteristics and are suitable for multi-level analysis. After passing the null model test, the individual-level variables are then imported into the model to construct an individual main effect model and verify the main effect of individual goal orientation on knowledge sharing behavior. And then, the team main effect model is constructed by regressing the intercept at the first level to estimate the main effect at the team level. Finally, the cross-level interaction effect model is constructed by regressing the slope at the first level to test the interaction effect of team-level variables. The analysis results of the hierarchical linear model are shown in Table 5.

According to Table 5, after entering the individual-level variables on the basis of the null model, the coefficients entering the individual-level variables all pass the significance test, and the direction of the coefficients matches the hypothesis that the individual variable (goal orientation) could explain 53.5% of the intra-group variation in knowledge sharing behavior; therefore, Hypotheses H_{1a} , H_{1b} , and H_{1c} are supported. The team-level variable, team innovation climate, is added to construct a model with intercept as the outcome variable. According to the results of the model analysis, the coefficient of the individual-level variables remains significant and also in the same direction as the hypotheses, and Hypotheses H_{1a} , H_{1b} , and H_{1c} are further verified. After controlling the individual-level variables, the coefficient of team innovation climate is significant ($r = 0.32$, $p < 0.01$), and the intercept residual variance $\tau = 0.16$ ($p < 0.05$). So innovation climate explains 31.7% of the inter-group variance in behavior, and Hypothesis H_3 is supported. Finally, a model with the slope of the first level as the outcome variable is constructed to examine the cross-level interaction of team innovation climate. The coefficient of the performance proof orientation and knowledge sharing interaction term ($r = 0.08$, $p < 0.05$) is statistically significant, with slope variance $\tau = 0.17$ ($p < 0.05$) and chi-square value $\chi^2(28) = 53.91$, $p = 0.08$, from which the slope variance of the proof orientation is calculated. With 36.8% team innovation climate, Hypothesis H_{4b} is supported. The coefficients of both learning orientation and knowledge sharing behavior is not significant, and the coefficients of performance avoidance orientation and knowledge sharing behavior is not significant either, so Hypotheses H_{4a} and H_{4c} are not supported.

4.3.3. Moderating effect of political skill test

As only individual level variables are involved, this article uses SPSS 23.0 to test the moderating effect of political skills. Firstly, we examine the moderating effect of political skills on the relationship between learning goal orientation and knowledge sharing. According to Table 6, the interaction coefficient of learning goal orientation \times political skills is significant, with a standardized positive regression coefficient of 0.167 ($p < 0.01$, M12). Hence, Hypothesis H_{2a} is supported. That is to say, in the context of high-level political skills, learning goal orientation has an enhanced promoting effect on knowledge sharing. Secondly, we test the moderating effect of political skills on the relationship between performance proof orientation and knowledge sharing. As is shown in Table 6, the interaction coefficient of performance proof-oriented \times political skills is significant, with a standardized positive regression coefficient of 0.175 ($p < 0.01$, M22). Therefore, Hypothesis H_{2b} is supported. In other words, the promotion effect of performance proof orientation on knowledge sharing is enhanced in the context of a higher level of political skills. Finally, the moderating effect of political skills on the relationship between performance avoidance orientation and knowledge sharing is tested. According to Table 6, the interaction coefficient of performance avoidance oriented \times political skills is significant, with a standardized negative regression coefficient of -0.179 ($p < 0.01$, M32). Thus, Hypothesis H_{2c} is supported. That is, in the context of a higher level of political skills, the reverse effect of performance proof orientation on knowledge sharing is enhanced.

So far, all the hypothesis tests have been completed. Hypothesis H_1 , H_2 , H_3 are supported; Hypothesis H_4 is partly supported. The present study shows that learning goal orientation and performance proof orientation have positive promotion effects on teachers' knowledge sharing behaviors, while performance avoidance orientation has adverse effects on knowledge sharing behaviors.

Table 5
Hierarchical Linear Model analysis results.

Variables	Individual level main effect model	Team level main effect model	Cross-level interaction model
Individual level			
1. Learning goal orientation	0.25**	0.24**	0.37
2. Performance proof orientation	0.12**	0.21**	-0.43*
3. Performance avoidance orientation	-0.16*	-0.20**	-0.29
Team level			
4. Team innovation climate		0.32**	0.19
Interaction item			
1 \times 4			-0.12
2 \times 4			0.07*
3 \times 4			0.08
Fitting likelihood value			
	772.36	728.80	690.44
R^2 individual level	0.62		
R^2 team level		0.33	
$R^2_{1 \times 4}$			Insignificant
$R^2_{2 \times 4}$			0.37
$R^2_{3 \times 4}$			Insignificant

Note. Individual $n = 345$, team $n = 29$.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6
Testing the moderating effect of political skill.

variables	Knowledge sharing behavior					
	M11	M12	M21	M22	M31	M32
Learning goal orientation	0.542***	0.488***				
Performance proof orientation			0.432***	0.381***		
Performance avoidance orientation					0.360***	0.389***
Individual Political skill	-0.251***	-0.252***	-0.305***	-0.287***	0.081	0.072
Learning goal orientation × Political skill		0.167**				
Performance proof orientation × Political skill				0.175**		
Performance avoidance orientation × Political skill						-0.179**
R2	0.515	0.527	0.428	0.430	0.247	0.256
ΔR2	0.501	0.513	0.403	0.411	0.187	0.193
F	25.468***	22.746***	22.901***	21.754***	8.440***	6.068***

Note. N = 345.

*p < 0.05, **p < 0.01, ***p < 0.001.

Compared with learning goal-oriented teachers, the performance proof-oriented teachers exhibit more positive knowledge sharing behavior; Political skills positively moderate the relationship between learning goal orientation and knowledge sharing behavior, and between performance proof orientation and knowledge sharing behavior. Political skills negatively regulate the relationship between performance avoidance orientation and knowledge sharing behavior. Team innovation climate not only has direct effects on teachers' knowledge sharing behaviors, but also has hierarchical moderating effects on the relationship between goal orientation and knowledge sharing behaviors: the stronger the team innovation climate is, the more performance proof-oriented individuals tend to share knowledge.

5. Conclusion and contribution

The current world is innovation-oriented and attaches great importance to high-quality development. The leaders are facing dual challenges in solving the dilemma of lack of knowledge sharing in practice. They not only identify employees with development potential, but also create a team situation conducive to innovation [33,127,128]. Do differences in employee goal orientation explain individual differences in the performance of knowledge sharing behavior? What are the internal mechanisms and boundary conditions of the team innovation climate affecting the role of individual traits? These theoretical problems have not been well resolved. This paper systematically examines the influence mechanism of achievement goal orientation and its interaction effect with the innovative atmosphere on employee knowledge sharing.

Compared with previous studies, this study shows two differences. On the one hand, we use the cross-level analysis method of integrating individual and organization in the paper. Previous studies often prefer to explore the constraints of knowledge sharing willingness from the perspective of knowledge owners. Some scholars [27,127] point out that many issues in organizational innovation activities involve in multi-level or cross level factors, and it is often difficult to draw accurate conclusions from a single perspective. On the other hand, previous researchers study the influence of an organizational environmental factor on knowledge sharing activities from different perspectives. However, innovation climate is a comprehensive indicator that requires multiple factors to collaborate, which has greater research value and practical significance to explore the relationship between individual goal orientation and knowledge sharing from the perspective of innovative atmosphere rather than a single organizational environmental factor. The novelty of this study lies in incorporating team atmosphere into the relationship chain between members' personality characteristics and knowledge sharing behaviors, a hierarchical linear model is constructed and verified by data which comes from the research teams of Chinese universities. This study has presented the following findings.

5.1. Conclusion

The study finds that learning goal orientation and performance proof orientation contribute to knowledge sharing, performance avoidance orientation tends to hide knowledge, and their political skills consolidate the connections. Team innovation climate not only promotes knowledge sharing, but also activates the traits related to the shared behavior in performance proof oriented individuals, thus enhancing the strength of the relationship between achievement goal orientation and knowledge sharing, but it has no effect on learning goal orientation and performance avoidance orientation.

5.2. Theoretical contribution

First of all, this paper goes further to clarify the relationship between achievement goal orientation and knowledge sharing behavior. Previous studies have not reached a consistent explanation of the relationship between the two. This paper regards achievement goal orientation as the reflection of individual personality traits, discusses its different effects on knowledge sharing

behavior, analyzes the positive and negative moderating effects and effects of individual political skill level, which expands the research of achievement goal orientation in the field of knowledge management.

Besides, this study reveals the relationship between innovation climate and knowledge management behavior. Innovation climate not only promotes knowledge sharing, but also activates the traits related to the shared behavior in performance proof-oriented individuals, thus enhancing the strength of the relationship between achievement goal-oriented and knowledge sharing. The results also shows that the level of knowledge sharing among learning goal-oriented individuals and the level of knowledge concealment of performance avoidance-oriented individuals are not influenced by the organizational innovation climate. This shows the cognitive tendency of achievement goal orientation as achievement motivation, which is not only a stable trait of individual character, but also has an unstable situational feature.

Lastly, this research enriches the results of individual knowledge management and explores the influencing factors of individual knowledge management behavior based on goal-oriented theory. Previous studies focus on the influence of personality traits (such as Big Five Personality) on knowledge management behavior, and ignore the influence of individual intrinsic achievement motivation on knowledge management behavior. This study reveals that discrepancy cognition can motivate individuals to adopt different knowledge sharing strategies, and emphasizes that discrepancy intrinsic achievement motivations have different impacts on sharing behavior.

5.3. Practical contribution

This paper not only enriches the knowledge sharing literature, but also provides some valuable insights for knowledge management practices in higher education institutions.

Firstly, given that teachers with the discrepancy of achievement goal orientations show different willingness to share knowledge, universities are expected to conduct a series of personality trait tests when recruiting teachers and building research teams, carefully screen the types of achievement goal orientations of the candidates, and select those teachers with a learning goal orientation, so as to promote teachers' knowledge sharing and build a learning-type university.

Secondly, college administrators are expected to take various management measures such as psychological training, information communication, performance feedback, and public praise to enhance their self-confidence, self-efficacy, and cognition of colleague relationships, which promote the positive transformation of teacher personality traits from proof-oriented to learning-oriented.

Thirdly, higher education institutions make full use of the role of external incentives, especially for achievement goal orientation individuals, and design an effective incentive system based on the principle of interest exchange to mobilize their will to share knowledge.

Finally, we are expected to actively create a team innovation climate that promote knowledge sharing, such as a free and open academic atmosphere, a consultative leadership style, and the campus culture that encourages challenges and innovations, so as to foster the values and behavioral norms of cooperation and win-win among teachers. Such atmosphere is sure to promote easy and free knowledge sharing among teachers with different motivations.

6. Limitations and future research

6.1. Limitations

Although this study has drawn some conclusions that may be useful for higher education management practices, there are still some limitations.

Above all, the research has been a cross-sectional study. Might it have been different if the study had been a longitudinal study?

Moreover, the research is conducted at academic institutions. Might the results differ if the study has been conducted in another industry (such as mobile communication, car manufacturing, technology service companies etc.)?

In addition, in this paper, the R&D team is selected as the research object, and the situational influence of the R&D team is relatively stronger. Therefore, whether the relevant conclusions can be extended to the general team task activities still needs further analysis.

Lastly, Psychological safety is a widely recognized contributor to knowledge sharing, however the authors didn't control its effects. These limitations and deficiencies indicate the direction for our future research.

6.2. Future research

First, when incorporating team atmosphere into the relationship chain between members' personality characteristics and knowledge sharing behaviors, the authors does not consider the influence of team nature, team type, regional and cultural differences, and team size, etc. Subsequent studies may consider including these factors as control variables in the model for in-depth research.

Second, the operation and definition of the concepts of individual goal orientation, team innovation climate, and knowledge sharing behavior need to be further refined and need to be improved in future research.

Third, this paper adopts the classical three-point method for the achievement goal-oriented dimension. With the deepening of the research of the achievement goal theory, a four-dimensional theoretical framework system is gradually formed, which can further push on the research on this topic.

Fourth, according to the motivation process model, there may be some continuous stages from knowledge sharing motivation to knowledge sharing behavior. Future studies can select volition or intention as the mediating variable to more profoundly reveal the

mechanism of achievement motive on knowledge sharing behavior.

Finally, this paper is insufficient in sample. In the future research, the authors may consider to collect tracking data, expanding the sample size, and conducting a truly large sample of empirical research to enrich and supplement research conclusions herein.

Data availability statement

Data will be made available on request.

Ethical statement

Not applicable.

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CRedit authorship contribution statement

Zhizhu Lei: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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